AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An apparatus for performing speech coding in a CELP system, said apparatus comprising:

an adaptive codebook in which previously synthesized execution signals are stored;

a stochastic codebook in which a plurality of excitation vectors are stored, said stochastic codebook comprising a first subcodebook in which excitation vectors composed of a small number of pulses are stored and a second subcodebook in which excitation vectors composed of a large number of pulses are stored;

a synthesized speech obtainer that obtains synthesized speech using excitation information acquired from said adaptive codebook and said stochastic codebook [[,]] using linear prediction coefficients obtained by performing linear prediction coefficient analysis on an input speech signal;

a gain information obtainer that obtains gain information of said synthesized speech using a relation of said synthesized speech and said input speech signal; and

a transmitter that transmits said linear prediction coefficients, said excitation information and said gain information,

wherein said stochastic codebook comprises a controller that controls a gain for respective excitation vectors in said first subcodebook and said second subcodebook corresponding to a distance between pulses of the excitation vectors in said ~~first subcodebook~~ subcodebooks and a computation system that obtains the excitation information using the gain controlled excitation vectors.

2. Canceled

3. (Previously Presented) The apparatus according to claim 1, wherein said controller makes the gain of the excitation vectors in said second subcodebook small when the distance between pulses of the excitation vectors in said first subcodebook is short, and makes the gain for the excitation vectors in said second subcodebook large when the distance between pulses of excitation vectors in said first subcodebook is long.

4. (Previously Presented) The apparatus according to claim 3, wherein said controller calculates the gain according to a following equation:

$$g = | P1 - P2 | / L$$

wherein g is the gain, P1 and P2 are respectively excitation vector posts in first subcodebook, and L is a vector length.

5. (Previously Presented) An apparatus for performing speech coding in a CELP system, said apparatus comprising:

an adaptive codebook in which previously synthesized execution signals are stored;

a stochastic codebook in which a plurality of excitation vectors are stored, said stochastic codebook comprising a first subcodebook in which excitation vectors composed of a small number of pulses are stored and a second subcodebook in which excitation vectors composed of a large number of pulses are stored;

a synthesized speech obtainer that obtains synthesized speech using excitation information acquired from said adaptive codebook and said stochastic codebook, using linear prediction coefficients obtained by performing linear prediction coefficient analysis on an input speech signal;

a gain information obtainer that obtains gain information for said synthesized speech using a relation of said synthesized speech and said input speech signal; and

a transmitter that transmits said linear prediction coefficients, said excitation information and said gain information,

wherein said stochastic codebook has an instructor that instructs an excitation vector to be acquired from said first subcodebook and said second subcodebook corresponding to a distance between excitation vectors in said first subcodebook, and a switch that switches between outputs of the excitation vectors

in said first subcodebook and said second subcodebook according to the instruction by said instructor.

6. (Currently Amended) An apparatus for performing speech coding in a CELP system, said apparatus comprising:

an adaptive codebook in which previously synthesized execution signals are stored;

a stochastic codebook in which a plurality of excitation vectors are stored, said stochastic codebook comprising a first subcodebook in which excitation vectors comprising a small number of pulses are stored and a second subcodebook in which excitation vectors comprising a large number of pulses are stored;

a synthesized speech obtainer that obtains a synthesized speech using excitation information acquired from said adaptive codebook and said stochastic codebook, using linear prediction coefficients obtained by performing linear prediction coefficient analysis on an input speech signal;

a voice determiner that performs a voiced/unvoiced judgment on said input speech signal using said linear prediction coefficients;

a gain information obtainer that obtains gain information for said synthesized speech using a relation of said synthesized speech and said input speech signal; and

a transmitter that transmits said linear prediction coefficients, said excitation information and said gain information,

wherein said stochastic codebook has a controller that controls a gain for respective excitation vectors in said first subcodebook and said second subcodebook corresponding to a distance between pulses of the excitation vector in said ~~first subcodebook~~ subcodebooks, and a computation system that obtains the excitation information using the gain controlled excitation vectors.

7. Canceled

8. (Previously Presented) The apparatus according to claim 6, wherein said controller makes the gain for the excitation vector in said second subcodebook small when the distance between pulses of excitation vectors in said first subcodebook is short, and makes the gain for the excitation vector in said second subcodebook large when the distance between pulses of excitation vectors in said first subcodebook is long.

9. (Previously Presented) The apparatus according to claim 6, wherein said controller calculates the gain according to a following equation:

$$g = | P1-P2 | / R$$

wherein g is the gain, P1 and P2 are respectively excitation vector positions in said first subcodebook, and R represents a weighting coefficient and is a vector length L when a result of the voiced / unvoiced judgment indicates a voiced speech, and

L X 0.5 when the result of the voiced / unvoiced judgment indicates an unvoiced speech.

10. (Previously Presented) An apparatus for performing speech coding in a CELP system, said apparatus comprising:

an adaptive codebook in which previously synthesized execution signals are stored;

a stochastic codebook in which a plurality of excitation vectors are stored, said stochastic codebook comprising a first subcodebook in which excitation vectors comprising a small number of pulses are stored and a second subcodebook in which excitation vectors comprising a large number of pulses are stored;

a synthesized speech obtainer that obtains a synthesized speech using excitation information acquired from said adaptive codebook and said stochastic codebook, using linear prediction coefficients obtained by performing linear prediction coefficient analysis on an input speech signal;

a determiner that performs a voiced/unvoiced judgment on said input speech signal using said linear prediction coefficients;

a gain information obtainer that obtains gain information for said synthesized speech using a relation of said synthesized speech and said input speech signal; and

a transmitter that transmits said linear prediction coefficients, said excitation information and said gain information,

wherein said stochastic codebook comprises an instructor that instructs an excitation vector to be acquired from said first subcodebook and said second subcodebook corresponding to a distance between excitation vectors of said first subcodebook, and a switch that switches between outputs of the excitation vectors in said first subcodebook and said second subcodebook according to the instruction by said instructor.

11. (Currently Amended) An apparatus for performing speech coding in a CELP system, said apparatus comprising:

an adaptive codebook in which previously synthesized excitation signals are stored;

a stochastic codebook in which a plurality of excitation vectors are stored, said stochastic codebook comprising a first subcodebook in which excitation vectors comprising a small number of pulses are stored and a second subcodebook in which excitation vectors comprising a large number of pulses are stored;

a receiver that receives linear prediction coefficients, excitation information and gain information transmitted from a coding side; and

a speech decoder that decodes a speech using said excitation information multiplied by said gain information, and said prediction coefficients,

wherein said stochastic codebook has a controller that controls a gain for respective excitation vectors in said first subcodebook and said second subcodebook corresponding to a distance between pulses of the excitation vectors

in said ~~first subcodebook~~ subcodebooks and a computation system that obtains the excitation information using the gain controlled excitation vectors.

12. (Previously Presented) The apparatus according to claim 11, wherein said apparatus further comprises a linear prediction coefficient provider that provides said linear prediction coefficients to said stochastic codebook.

13. (Previously Presented) A method for performing speech coding in a CELP system, said method comprising:

controlling a gain for respective excitation vectors in a first subcodebook and a second subcodebook corresponding to a distance between pulses of excitation vectors in said first subcodebook of a stochastic codebook having said first subcodebook of a stochastic codebook comprising said first subcodebook in which excitation vectors comprising a small number of pulses are stored and said second subcodebook in which excitation vectors comprising a large number of pulses are stored;

obtaining excitation information using gain controlled excitation vectors;

obtaining a synthesized speech using excitation information acquired from an adaptive codebook and said stochastic codebook, using linear prediction coefficients obtained by performing linear prediction coefficient analysis on an input speech signal; and

obtaining gain information for said synthesized speech using a relation of said synthesized speech and said input speech signal.

14. (Previously Presented) The method according to claim 13, wherein said method further comprises performing a voiced / unvoiced judgment on said input speech signal using said linear prediction coefficients.

15. (Previously Presented) A method for performing speech coding in a CELP system, said method comprising:

selecting an excitation vector in at least one of a first subcodebook and a second subcodebook corresponding to a distance between pulses of excitation vectors in said first subcodebook of a stochastic codebook having said first subcodebook in which excitation vectors comprising a small number of pulses are stored and said second subcodebook in which excitation vectors comprising a large number of pulses are stored;

obtaining excitation information using the selected excitation vector;

obtaining a synthesized speech using excitation formation acquired from an adaptive codebook and said stochastic codebook, using linear prediction coefficients obtained by performing linear prediction coefficient analysis on an input speech signal; and obtaining gain information of said synthesized speech using a relation of said synthesized speech and said input speech signal.

16. (Previously Presented) The method according to claim 15, wherein said method further comprises performing a voiced/unvoiced judgment on said input speech signal using said linear prediction coefficients.

17. (Previously Presented) A recording medium readable by a computer, said medium storing a speech coding program comprising an adaptive codebook in which previously synthesized excitation signals are stored, and a stochastic codebook in which a plurality of excitation vectors are stored, said stochastic codebook having a first subcodebook in which excitation vectors comprising a small number of pulses are stored and a second subcodebook in which excitation vectors comprising a large number of pulses are stored, said program including computer instructions comprising:

controlling a gain for respective excitation vectors in said first subcodebook and said second subcodebook corresponding to a distance between pulses of excitation vectors in said first subcodebook of said stochastic codebook;

obtaining excitation information using gain controlled excitation vectors;

obtaining a synthesized speech using excitation information acquired from said adaptive codebook and said stochastic codebook, using linear prediction coefficients obtained by performing linear prediction coefficient analysis on an input speech signal; and

obtaining gain information for said synthesized speech using a relation of said synthesized speech and said input speech signal,

wherein said stochastic codebook has a controller that controls a gain for respective excitation vectors in said first subcodebook and said second subcodebook corresponding to a distance between pulses of the excitation vectors in said first subcodebook and a computation system that obtains the excitation information using the gain controlled excitation vectors.

18. (Previously Presented) An apparatus for performing speech coding in a CELP system, said apparatus comprising:

an adaptive codebook in which previously synthesized execution signals are stored;

a stochastic codebook in which a plurality of excitation vectors are stored, said stochastic codebook comprising a first subcodebook in which excitation vectors comprising a small number of pulses are stored and a second subcodebook in which excitation vectors comprising a large number of pulses are stored;

a receiver that receives linear prediction coefficients, excitation information and gain information transmitted from a coding side; and

a speech decoder that decodes a speech using said excitation information multiplied by said gain information, and said linear prediction coefficients,

wherein said stochastic codebook has an instructor that instructs an excitation vector to be acquired from said first subcodebook and said second subcodebook corresponding to a distance between excitation vectors in said first subcodebook, and a switch that switches between outputs of the excitation vectors

in said first subcodebook and said second subcodebook according to the instruction by said instructor.

19. (Previously Presented) The apparatus according to claim 18, wherein said apparatus further comprises a linear prediction coefficient provider that provides said linear prediction coefficients to said stochastic codebook.

20. (Previously Presented) A recording medium readable by a computer, said medium storing a speech coding program comprising an adaptive codebook in which previously synthesized excitation signals are stored, and a stochastic codebook in which a plurality of excitation vectors are stored, said stochastic codebook having a first subcodebook in which excitation vectors composed of a small number of pulses are stored and a second subcodebook in which excitation vectors comprising a large number of pulses are stored, said program including computer instructions comprising:

controlling a gain for respective excitation vectors in said first subcodebook and said second subcodebook corresponding to a distance between pulses of excitation vectors in said first subcodebook of said stochastic codebook;

obtaining excitation information using gain controlled excitation vectors;

obtaining a synthesized speech using excitation information acquired from said adaptive codebook and said stochastic codebook, using linear prediction

coefficients obtained by performing linear prediction coefficient analysis on an input speech signal; and

obtaining gain information of said synthesized speech using a relation of said synthesized speech and said input speech signal,

wherein said stochastic codebook has an instructor that instructs an excitation vector to be acquired from said first subcodebook and said second subcodebook corresponding to a distance between excitation vectors in said first subcodebook and a switch that switches between outputs of the excitation vectors in said first subcodebook and said second subcodebook according to the instruction by said instructor.